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assigned or determined for the data frames to generate spectrally-shaped coded data for transmission, the coding strategy selected on the basis of the node selected at the look-ahead depth according to the path metric.

REMARKS

Attached hereto is a marked-up version of the changes made to the specification and claims by the current preliminary amendment. The attached page is captioned "**Version With Markings to Show Changes Made.**"

In view of the foregoing, applicants respectfully request that all the claims in this application be allowed and this application be passed to issuance.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph beginning at line 7 of page 1 has been amended as follows:

This invention relates to systems ~~an~~ and methods for spectral shaping of signals in communications systems, and it is particularly applicable to data communication equipment like a modem.

Paragraph beginning at line 6 of page 2 has been amended as follows:

In accordance with an embodiment of the present invention, there is provided a method of coding digital data for transmission according to a trellis coding system having a predetermined number of (N) states and a predetermined number of (M) state transitions from each state, wherein the data is arranged in a series of frames, a state is associated with each frame to determine a coding strategy for the frame, and a look-ahead depth (D) representing a number of data frames is selected, ~~characterised by the step of~~including:

Paragraph beginning at line 22 of page 2 has been amended as follows:

The present invention also provides a data encoder for generating spectrally-shaped coded data according to a trellis coding system, wherein the data is arranged in a series of data frames from a data source and a trellis state is associated with each data frame such that a coding scheme for each frame may be determined on the basis of transitions of states for frames over a selected look-ahead depth (D), comprising:

Paragraph beginning at line 12 of page 3 has been amended as follows:

wherein said metric computation and trellis extension engine determines the selected coding scheme for the current frame according to the state stored in the current state storage and a node for the frame succeeding the current frame by the look-ahead depth which is selected on the basis of the path metric for the node, ~~characterised by~~including:

Paragraph beginning at line 19 of page 3 has been amended as follows:

In ~~the preferred for~~one embodiment of the present invention, the start-up phase and the steady state are unified. The trellis shaper chooses a predetermined valid trellis path during the start-up phase irrespective of the criterion for selection of the sub-tree. Once in the steady state, it uses the selection criterion to select the state transition.

Paragraph beginning at line 23 of page 3 has been amended as follows:

The trellis shaping function of ~~the preferred~~this embodiment is implemented with a linear structure that requires memory for only the nodes at level D of the binary tree. In the steady state phase, for each input spectral shaper frame X_{i+D} the preferred embodiment computes the path metric associated with each of the M^{D+1} paths. The node at level D+1 which satisfies the selection criterion is then chosen as the best path. The state transition from the current root node and the subsequent root node is determined by the current trellis state and the best path.

Paragraph beginning at line 30 of page 3 has been amended as follows:

~~The preferred~~This implementation provides a significant reduction in computation and memory requirements, and the performance penalty as a result is insignificant.

In the Claims:

Claims 1-9 have been amended as follows:

1. (Amended) A method of coding digital data for transmission according to a trellis coding system having a predetermined number of (N) states and a predetermined number of (M) state transitions from each state, wherein the data is arranged in a series of frames, a state is associated with each frame to determine a coding strategy for the frame, and a look-ahead depth (D) representing a number of data frames is selected, ~~characterised by the step of~~comprising:

assigning an initial state for a first frame of the series of data frames, and assigning states for the subsequent data frames in the series of data frames up to the look-ahead depth according to a predetermined valid trellis path;~~, the method further including:~~

sequentially fetching subsequent data frames in the series and determining respective states therefor based on a path metric for state transitions computed over the number of frames represented by the look-ahead depth; and

coding the data frames for transmission according to the coding strategies corresponding to the states assigned or determined for the frames, wherein the series of data frames arc coded for a shaped spectrum upon transmission thereof.

2. (Amended) The method of ~~A method as claimed in~~ claim 1, wherein fetched data frames are buffered over said look-ahead depth from a current frame X_i to a look-ahead depth frame X_{i+D}.

3. (Amended) The method of ~~A method as claimed in~~ claim 2, wherein node information for nodes representing possible state transitions at the look-ahead depth are stored in a node memory in an ordered array, and wherein the coding strategy for the current data frame X_i is determined on the basis of a node selected at the look-ahead depth according to said path metric.

4. (Amended) The method of ~~A method as claimed in~~ claim 3, wherein the node information in said node memory is replaced for each new data frame in the series.

5. (Amended) The method of ~~A method as claimed in~~ claim 3, wherein the coding strategy for the current data frame X_i is determined according to a state transition from the state associated with said current frame ~~which~~that is determined by a comparison of the position of the node selected at the look-ahead depth with at least one predetermined threshold.

6. (Amended) A data encoder for generating spectrally~~-~~shaped coded data according to a trellis coding system, wherein the data ~~is~~are arranged in a series of data frames from a data source and a trellis state is associated with each data frame such that a coding scheme for each frame may be determined on the basis of transitions of states for frames over a selected look-ahead depth (D) comprising:

a buffer memory coupled to the data source for buffering data frames in the series of data frames by the selected look-ahead depth (D);

a metric computation and trellis extension engine coupled to sequentially receive said data frames from the data source and determine node information in a plurality of nodes for each said frame representing possible states, state transitions from a preceding frame, and path metrics for the state transitions;

a current state storage coupled to the metric computation and trellis extension engine for storing the state of a current frame in the series of data frames;

a node memory coupled to the metric computation and trellis extension engine for storing said node information for nodes of a frame succeeding the current frame by the look-ahead depth;

a coding scheme memory for storing a correlation between state transitions and respective coding schemes; and

a processing circuit coupled to the coding scheme memory and to the metric computation and trellis extension engine for applying a selected coding scheme to a data frame to generate spectrally~~-~~shaped coded data;

~~wherein~~ said metric computation and trellis extension engine ~~determines~~is configured to determine the selected coding scheme for the current frame according to the state Stored in the current state storage and a node for the frame succeeding the current frame by the look-ahead depth ~~which~~that is selected on the basis of the path metric for the node~~, characterised by:~~

the metric computation and trellis extension engine assigning an initial state for a first frame of the series of data frames, and assigning states for the subsequent data frames in the series of data frames up to the look-ahead depth according to a predetermined valid trellis path.

7. (Amended) The encoder of ~~An encoder as claimed in~~ claim 6 wherein, for the first frames within the look-ahead depth of the series of data frames, states and state transitions are assigned according to a predetermined valid trellis path.

8. (Amended) The encoder of claim 6, ~~An encoder as claimed in claim 6 or 7,~~ wherein for each said data frame received by the metric computation and trellis extension engine the node information in the node memory is replaced with new node information representing the received data frame and the possible state transitions from the preceding data frame.

9. (Amended) The encoder of ~~An encoder as claimed in~~ claim 8, wherein the node information for the nodes is stored in linear array in said node memory, and wherein the coding scheme for the current frame is determined according to the position of the selected node within the node memory linear array.

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